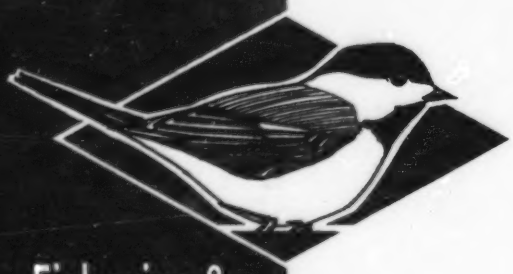
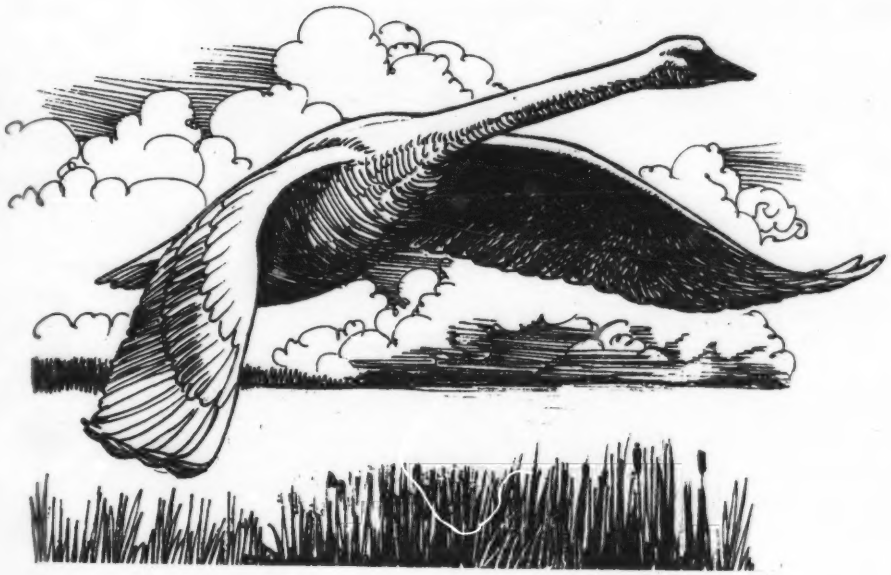


Fisheries & Wildlife Management Division

RESOURCE STATUS AND ASSESSMENT BRANCH

2000 Survey of the Trumpeter Swan (*Cygnus buccinator*) in Alberta



Alberta Species at Risk Report No. 5

Alberta

2000 Survey of the Trumpeter Swan (*Cygnus buccinator*) in Alberta

M. Lynne James and Adam James

Alberta Species at Risk Report No. 5

March 2001

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DISCLAIMER

The views and opinions expressed are those of the author(s) and do not necessarily represent the policies or positions of the Department or the Alberta Government.

EXECUTIVE SUMMARY

To help biologists and legislators to conserve trumpeter swans, a North America-wide census of trumpeter swans has been completed every five years since 1975. The Alberta portion of the 2000 trumpeter swan census was conducted from 7 August to 14 September. The purpose of the survey was to count, classify and determine the distribution of trumpeter swans for comparison with earlier surveys. Most surveys were conducted by intensive searching from fixed-wing aircraft or helicopters, and surveys in Elk Island National Park were conducted by regular ground checks during the breeding season. A record of 995 trumpeter swans were recorded in Alberta, including 668 adults and subadults (white swans), and 327 cygnets. 32.8% of all birds counted were cygnets. Trumpeter swans appear to be expanding their range in Alberta. In 2000, they occupied 274 locations, 80 more than they occupied in 1995. Continued protection, surveys, and management efforts are recommended to support the ongoing recovery of trumpeter swans in Alberta.

1.0 INTRODUCTION

Trumpeter swans (Cygnus buccinator) were once common throughout North America. Historically, they bred across North America; between Alaska and the Atlantic Coast, and as far south as Mississippi. They wintered in at least a portion of all of the contiguous 48 US states (Hansen 1973, Palmer 1976, Rogers and Hammer 1978, Mitchell 1994, Subcommittee on the Interior Population of Trumpeter Swans 1997). By the early 1900s, a combination of hunting and habitat destruction led the species to near extinction. At that time biologists thought that only 69 trumpeter swans remained in the world, breeding in the tristate area of Wyoming, Idaho and Montana, and also in the Grande Prairie region of Alberta (Banko 1960; Subcommittee on the Interior Population of Trumpeter Swans 1997). Although trumpeter swan populations have increased in many parts of its former range, (Mackay 1978, McKelvey et. al. 1985. Beyersbergen and Shandrak 1993, Subcommittee on the Interior Population of Trumpeter Swans 1997), they are still listed as a threatened animal under the Alberta Wildlife Act.

Trumpeter swans are divided into three breeding populations, the Pacific Coast Population, the Rocky Mountain Population, and the Interior Population (Figure 1). The Pacific Coast Population breeds in Alaska and winters along the Pacific Coast in southwestern Alaska, western and south-central British Columbia, western Washington and western Oregon (Hansen et. al 1971, Conant et al. 1984, Mitchell 1994). The Interior Population includes birds breeding in eastern Saskatchewan, Ontario, Eastern Wyoming and eastern Montana (Mitchell 1994, Subcommittee on the Interior Population of Trumpeter Swans 1997). The Interior Population swans winter in Illinois, Iowa, South Dakota, Nebraska and Kansas. Between the Pacific Coast Population and the Interior Population lies the Rocky Mountain Population.

The Rocky Mountain Population is divided into two subpopulations. The non-migratory tristate population is located in northwestern Wyoming, Idaho and southwestern Montana. The Canadian subpopulation breeds in scattered flocks in northeastern British Columbia, southeastern Yukon, southwestern Northwest Territories and Alberta (McCormick 1984, McKelvey 1984, Beyersbergen and Shandrak 1993, Subcommittee on the Interior Population of Trumpeter Swans 1997). Within Alberta, some swans have been found in southwestern Alberta, Elk Island National Park, and Lac La Biche, but most breed in the northwestern quarter of the province, in the Grande Prairie, High Prairie and Peace River regions.

Summer breeding habitat for Alberta's trumpeter swans includes lakes and marshes in the Aspen Parkland and Boreal Ecoregions (Strong and Leggat 1992). Trumpeter swan nesting lakes in Alberta generally have at least five common characteristics: a) lake water levels do not have marked seasonal fluctuations, b) waters are quiet, without strong wave actions or currents, c) the water is shallow, so the swans can dig for the tubers and roots of aquatic plants, d) there are areas of emergent vegetation, and e) the lakes are usually isolated from human disturbance (Banko 1960, Nordstrom 1984). Within these lakes, swan nests are often located near shore, on small islands, or on muskrat and beaver lodges (Hansen et. Al, 1971, Brechtel 1982).

Nearly all of Alberta's trumpeter swans winter in the tristate area where the borders of Montana, Idaho and Wyoming meet (Shea 1979). Within this area, most of Alberta's swans (and 90% of the Rocky Mountain population) winter on a crowded 14km stretch of the Snake River near Harriman State Park in Idaho (Reiswig 1984). Swans can winter here because mild microclimates cause an almost annual midwinter thaw that keeps that water from freezing over (McEneaney 1984). However, in 1984 and 1989 severe winter conditions caused the Snake River to freeze, resulting in the death of 50 and 100 swans, respectively (Alvo 1996).

There are several limiting factors that slow trumpeter swan recovery efforts. For Alberta's trumpeter swans, and the Rocky Mountain population as a whole, the primary limiting factor is a critical shortage of winter habitat (Shea 1979, Mackay 1981, Brechtel 1982). A second limiting factor is disturbance in breeding habitat; while trumpeter swans can become accustomed to air traffic and small amounts of automobile traffic, they are very sensitive to extremely loud traffic, boating, floatplanes and pedestrian traffic (Holton 1982, Henson and Grant 1991). Disturbance can disrupt feeding behaviour, and can force females to take extended absences from their nests, resulting in nest failures or cygnet loss. Third, Alberta's trumpeters swans may be limited in the Aspen Parkland region by a lack of breeding habitat; this habitat loss has accompanied agricultural water manipulation and drainage, industrial development and urbanization. Finally, a few swans are lost every year to accidental hunting and collisions with power lines (Drewien and Bouffard 1994, Lockman et. al 1987, Gillette 1990, Lockman 1990).

Today, as a result of protective legislation and management, trumpeter swan populations are increasing. To help biologists and legislators to conserve trumpeter swans, a North America-wide census of trumpeter swans has been completed every five years since 1975. The Alberta portion of the 2000 trumpeter swan census was conducted from 7 August to 14 September. The purpose of the survey was to count, classify and determine the distribution of trumpeter swans for comparison with earlier surveys.

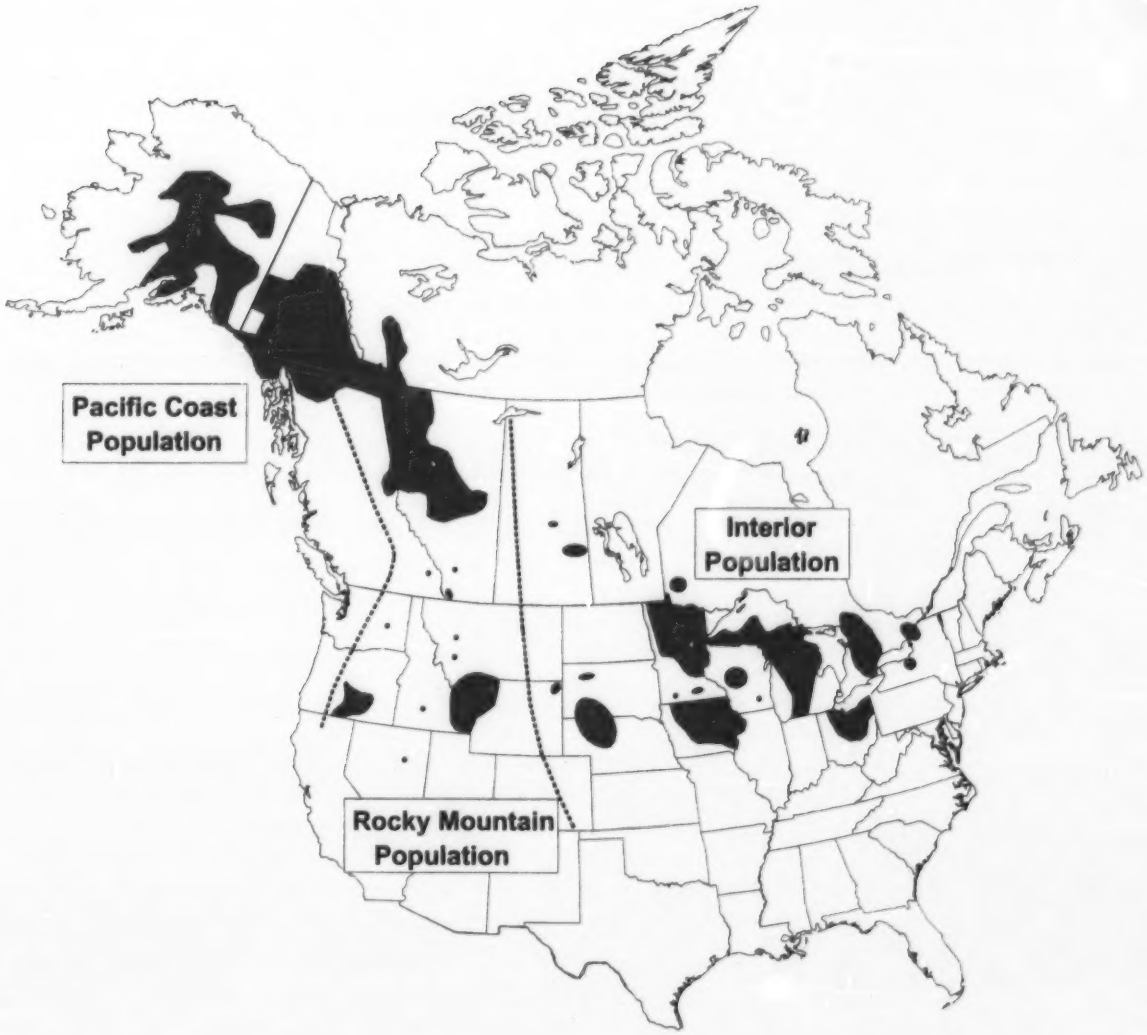

Figure 1. Approximate ranges for the Pacific Coast Population, Rocky Mountain Population and Interior Population in late summer 2000 (Figure from Caithamer 2001).

2.0 METHODS

2.1 Survey Dates and Locations

The Alberta portion of the 2000 trumpeter swan census was conducted between 7 August and 14 September. The survey included all waterbodies that have been occupied by trumpeter swans previously, and some new waterbodies that were suspected to contain swans; survey dates and survey effort is outlined in Appendix 2. The regions that were surveyed are:

- *Grande Prairie.* Survey effort and area covered was similar to previous years.
- *Peace River.* Survey effort and area covered was similar to previous years.
- *High Level.* Survey effort and area covered was similar to previous years.
- *High Prairie.* Survey area was expanded to include a region north of Utikama Lake, west of Peerless Lake and south of Sawn Lake.
- *Edson.* Survey area was expanded to include two new locations in the Drayton Valley area; survey effort was 4 times greater in 2000 than in 1995.
- *Lac La Biche.* Survey area was expanded to include lakes further north toward Fort McMurray.
- *Elk Island.* Survey effort and area covered was similar to previous years.
- *Pincher Creek.* Survey effort and area covered was similar to previous years.

2.2 Survey Methods

Most surveys were conducted by intensive searching from fixed-wing aircraft. However, surveys in the Pincher Creek and High Level areas were conducted from helicopters, and surveys in Elk Island National Park were conducted by regular ground checks during the breeding season.

Trumpeter swan locations were recorded with GPS units and/or marked on 1:250000 topographic maps. Locations from the 2000 census were compared with previous locations and many new locations were added. Survey results were considered as total minimum population size. No efforts were made to estimate the number of additional swans that may have been missed during the survey.

3.0 RESULTS

In 2000 a record of 995 trumpeter swans were recorded in Alberta, including 668 adults and subadults (white swans), and 327 cygnets. 32.8% of all birds counted were cygnets. Data for all of Alberta are summarized in Tables 1 and 2, Figure 2, and Appendix 3. Table 1 outlines, for each region, the 2000 census of white swan and cygnets; Table 2 outlines trumpeter swan reproductive success. Figure 2 illustrates the trumpeter swan locations observed during the Alberta census. Appendix 3 lists all waterbodies surveyed in the 2000 census.

Table 1. Counts of white swans, cygnets and swan locations from 7 August to 14 September 2000.

REGION	TOTAL SWANS	TOTAL WHITE SWANS	WHITE SWANS PAIRED AND/OR WITH CYGNETS	WHITE SWANS AS SINGLES OR FLOCKS	CYGNETS	LOCATIONS OCCUPIED
High Level	24	13	12	1	11	5
Peace River	200	141	120	21	59	65
High Prairie	72	37	22	15	35	16
Grande Prairie	608	404	222	182	204	134
Lac La Biche	9	9	4	5	0	5
Edson	32	29	22	7	3	15
Elk Island	13	8	8	0	5	4
Pincher Creek	37	27	14	13	10	11
TOTAL	**995**	**668**	**424**	**244**	**327**	**255**

3.1 Grande Prairie

In the Grande Prairie region, 404 adults and 204 cygnets were found; the largest number of trumpeter swans ever recorded in the area (Table 1). Of these 608 swans, 182 were white swans found as single birds or in flocks, with the largest flock at Bear Lake where 101 swans were counted. Survey coverage was similar to previous years, though some new lakes were surveyed near the British Columbia border. In total, swans were found on 134 waterbodies, and they continue to expand to waterbodies east and south of Grande Prairie into the Valleyview area (Figure 2 and Figure 3). The reproductive success of the Grande Prairie swans was excellent; this area had 60 successful broods, an average of 3.4 cygnets per brood, and 33.6% of all swans counted were cygnets (Table 2).

3.2 High Level

In the High Level area, swans were found on 5 waterbodies near the Bistcho Lake area and the Spawn Lake area (Figure 2). Near Bistcho Lake, 7 adult swans and 5 cygnets were found. Near Spawn Lake in early October, a pilot counted 12 swans, including 3 adult pairs, with broods of 3,2 and 1 cygnet(s) (Table 1). In this small subpopulation, breeding success was very high, as 45.8% of the birds counted were cygnets.

3.3 Peace River

In the Peace River Region, a large area northwest of Peace River, 200 swans were found. Of these 200, 141 were white swans and 21 of the white swans were found as singles or

in flocks (Table 1). The remaining paired white swans produced 59 cygnets in 20 broods with an average brood size of 2.95 cygnets (Table 2). Swans in this area occupied lakes that had been used previously, and there was little change in total numbers and distribution over previous years.

Table 2. Reproductive success of Alberta's Trumpeter Swans in 2000

REGION	% CYGNETS	NUMBER OF BROODS	MEAN BROOD SIZE
High Level	45.8	4	2.75
Peace River	29.5	20	2.95
High Prairie	48.6	7	5.00
Grande Prairie	33.6	60	3.40
Lac La Biche	0	0	0.0
Edson	9.4	2	1.50
Elk Island	38.5	2	2.50
Pincher Creek	27.0	3	3.3

3.4 High Prairie

In the High Prairie Region, survey coverage was expanded to include a region north of Utikama Lake, west of Peerless Lake and south of Sawn Lake. Large numbers of swans were observed in this area, including 37 white swans and 35 cygnets for a total of 72 swans. The 22 white swans that were found in pairs had excellent reproductive success; they produced 7 broods, with an average of 5 cygnets per brood (Table 2).

3.5 Edson

In the Edson region, survey effort in 2000 was 4 times higher than in 1995, but swans were found on no new lakes in the region. 29 white swans and only 3 cygnets were counted, for a total of 32 swans (Table 1). Although there were 11 pairs of white swans, there were only 2 broods, with an average clutch size of 1.5 (Table 2). Swans in this region were found on 15 waterbodies.

3.6 Lac La Biche

In the Lac La Biche region, survey effort and coverage was greater in 2000 than in previous surveys. In particular, lakes around St. Paul, Lac La Biche, and further north were surveyed for the first time. Despite this effort, only 9 swans were found on 5

waterbodies. Of these 9 swans, there were 2 pairs, 2 singles and a group of singles; no cygnets were found.

3.7 Elk Island National Park

In Elk Island National Park, 4 pairs of white swans and 5 cygnets were counted, for a total of 13 swans. 2 of the 4 pairs nested successfully, and they had broods of 2 and 3 cygnets (Table 1 and Table 2).

3.8 Pincher Creek

In the Pincher Creek region, survey coverage and effort was similar to previous surveys. In this region, 10 cygnets and 27 white swans were found, for a total of 37 swans. Of the 27 white swans, 13 were found as singles or in flocks, and 14 were paired. Three broods were found, averaging 3.3 cygnets per brood.

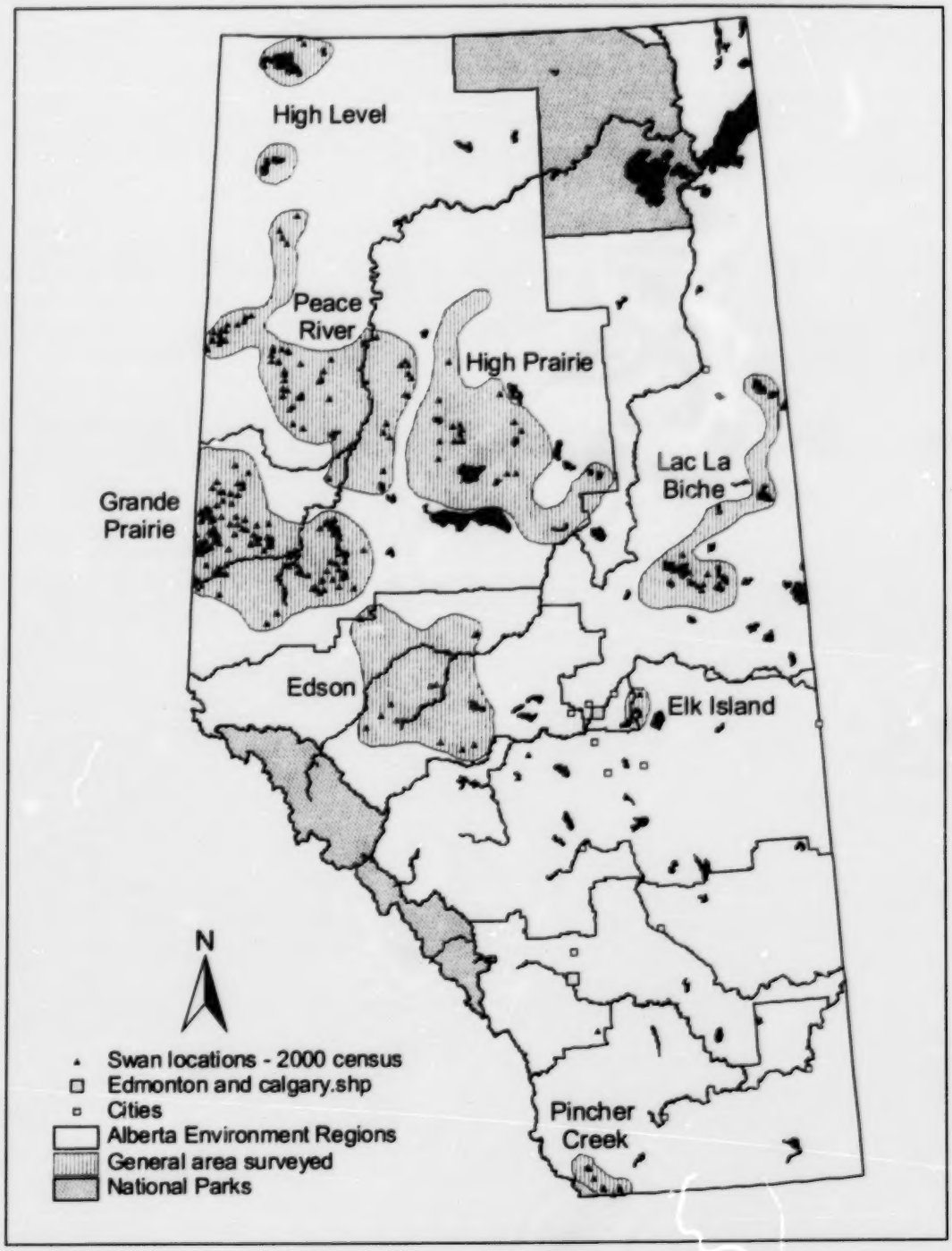

Figure 2. Trumpeter swan locations observed during the Alberta census conducted between 7 August and 14 September 2000.

4.0 DISCUSSION

Trumpeter swan numbers appear to be increasing across North America. In the 2000 census, a total of 23 647 swans were counted – 3 900 more than in 1995, and 20 000 more than in 1968 (Caithamer 2001). All three major swan populations have increased since the 1995 survey (Figure 2): The Pacific Coast Population grew by 1 200 individuals (8%), Interior Population grew by 1 500 birds (150%) and the Rocky Mountain Population grew by 1 100 individuals (46%) (Caithamer 2001).

A substantial portion of the Rocky Mountain Population increase has occurred in Alberta. In Alberta, trumpeter swan numbers have risen from 67 birds in 1965 to 995 birds in 2000. In fact, 2000 was a record year for trumpeter swans in Alberta, numbers are up from 618 swans (68% increase) since the last continent-wide census in 1995 (Alberta Environment and Canadian Wildlife Service, unpublished data).

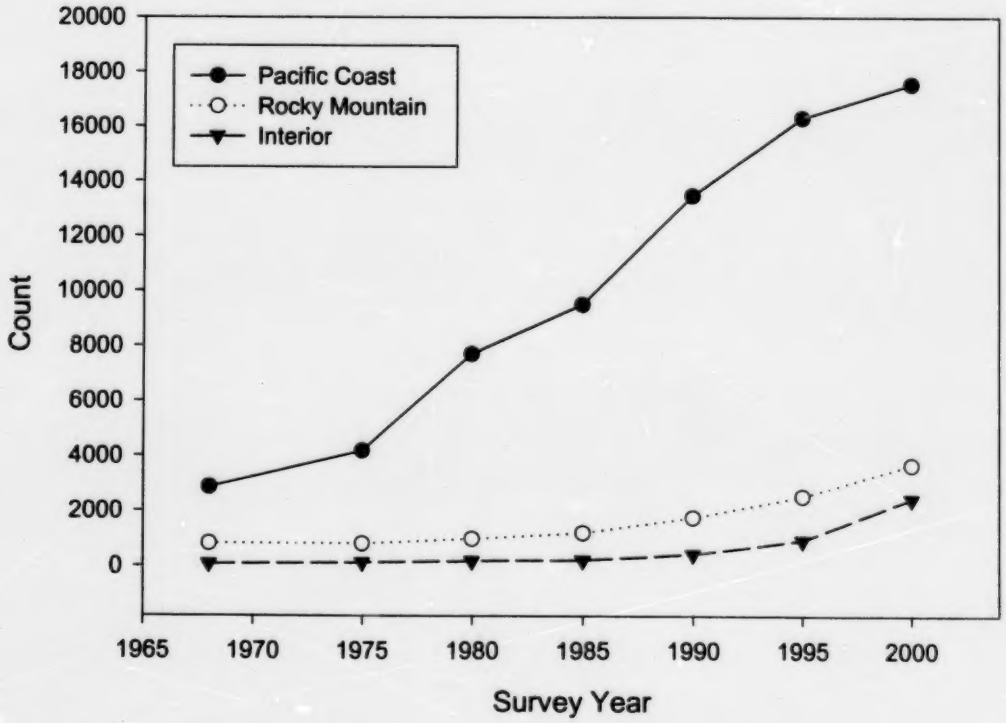

Figure 3. Trends in the world population of trumpeter swans, 1968-2000 (adapted from Caithamer 2001)

Within Alberta, the Grande Prairie region had the largest swan population and the largest increase in swan numbers since 1995. A large portion (61%) of Alberta's trumpeter swans still breed in the Grande Prairie area. The Grande Prairie area has seen a steady, though fluctuating, increase in trumpeter swans since 1957 (Figure 3). Swans in the Grande Prairie region have also been expanding into new lakes east and south of Grande Prairie (Figure 4).

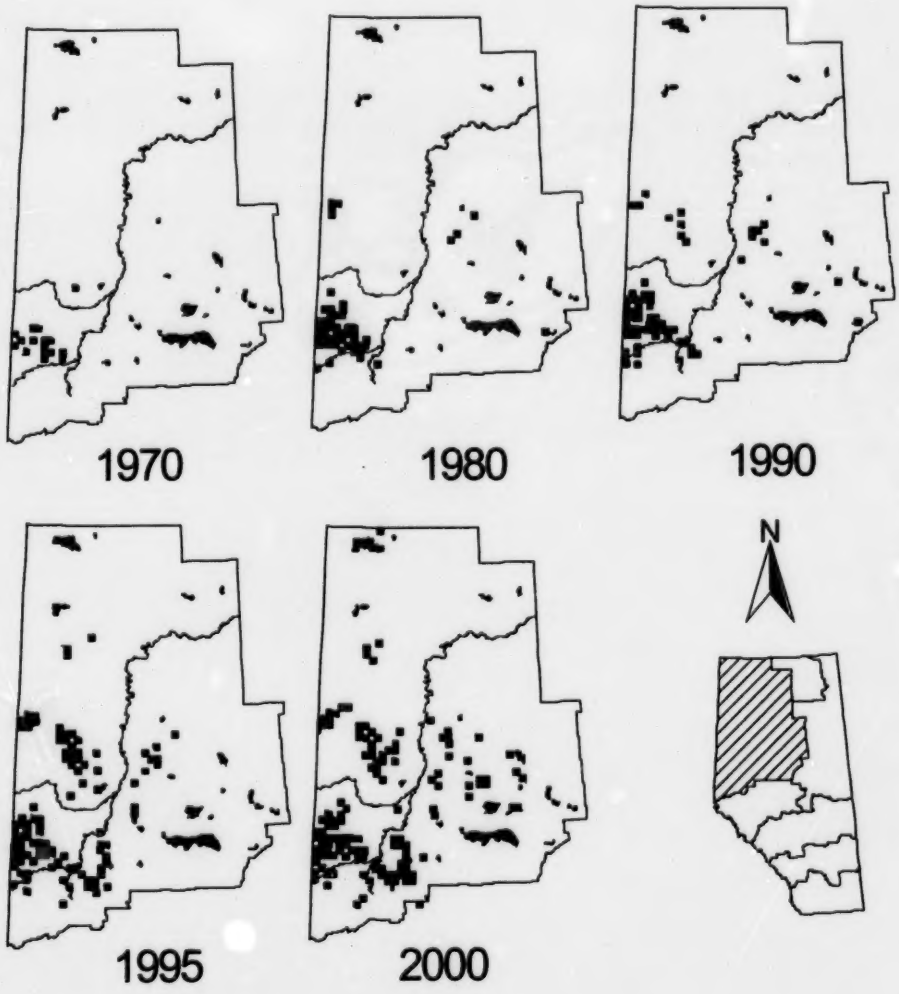

Figure 4. Trumpeter swan locations in the Grande Prairie region since 1970. Trumpeter swans are expanding onto lakes south and east of Grande Prairie.

In the Grande Prairie area, a large flock of 101 white swans were found on Bear Lake. It is not clear where these swans spent the summer, but it is possible that they failed to breed successfully, and began staging early. Norton and Beyersbergen (2000) noticed that there were relatively few swans found in the Saddle Hills area of the Grande Prairie region, and suggested that some of the Bear Lake flock may have come from the Saddle Hills.

Trumpeter swan numbers also increased in the High Prairie subregion. However, some of the population increase in the High Prairie subregion may be the result of expanded survey effort, and we do not know if swans occupied these new waterbodies in previous years. Despite the increase in survey effort and survey area from 1995 to 2000, a comparison of similar survey areas from 1995 and 2000 shows that trumpeter swan numbers are growing throughout Alberta (Table 3).

In the Lac La Biche and Edson regions, results were mixed. Although a relatively high number of swans were observed in this region (32) this year, only 3 cygnets were found

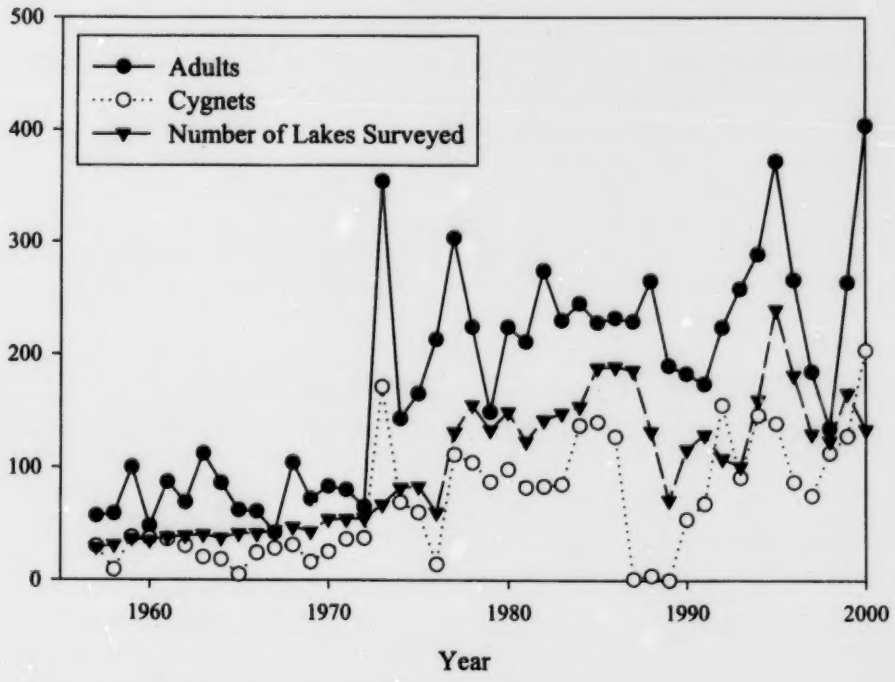

Figure 5. Number of adults and cygnets recorded during aerial surveys from 1957 to 2000 in the Grande Prairie are (updated from the January 2000 *Status of the Trumpeter Swan in Alberta*).

and the survey area was quadrupled over previous years. Since 1978, when surveys of this region began, the number of cygnets found in this region has been 3 or fewer in only 7 out of 22 survey years. On the other hand, 29 adult cygnets were found in this region, which is the second highest number of adult swans ever recorded in the Edson region. Like Edson, the Lac La Biche region had more swans than usual (in 1998 only 2 adults, no cygnets were found), but there was no recruitment.

Trumpeter swans in Elk Island National Park have reproduced successfully for three years in a row (1998-2001). This is an important achievement, because the park is the site of a trumpeter swan reintroduction program that began in the 1990s. The purpose of this project was to establish a new breeding population of trumpeter swans, to address concern that human disturbance and habitat loss may be a threat to the expansion and long-term survival of the Grande Prairie swan population. In this study, trumpeter swan family groups were relocated from the Grande Prairie area to the park. While the adults in these family groups subsequently returned to the Grande Prairie area, the cygnets returned to Elk Island Park as subadults and successfully bred for the first time in 1998.

Finally, in the Pincher Creek region, record numbers (37) of swans were counted in 2000. This number is up from 1995 and 1996 when 21 and 26 swans were found in the survey area respectively. The presence of 10 cygnets during the 2000 survey accounts for much of the increase in numbers over previous years.

Trumpeter swans appear to be expanding their range in Alberta. In 2000, they occupied 255 locations, 80 more than they occupied in 1995. Some of this increase may be due to expanded survey areas, however, even within similar survey areas, trumpeter swans occupied a larger number of lakes in 2000 than in 1995 (Table 3).

Table 3. A Comparison of 1995 and 2000 Trumpeter Swan Survey Results for Alberta. There are no data for the Lac La Biche subregion or the Utikama Lake subregion from the 1995 survey. (adapted from Beyersbergen and Norton 2000).

SUBREGION	YEAR	LOCATIONS	ADULTS	CYGNETS	NO. BROODS	TOTAL SWANS
Grande Prairie	1995	99	392	141	41	533
	2000	134	404	204	60	608
Peace-River-High Level-High Prairie	1995	66	132	67	25	199
	2000	68	148	64	21	212
Edson	1995	9	18	10	4	28
	2000	15	29	3	2	32
Elk Island National Park	1995	4	11	0	0	11
	2000	4	13	5	2	13
Pincher Creek	1995	14	21	0	0	21
	2000	11	27	10	3	37
TOTAL	1995	192	574	218	70	792
	2000	232	621	268	89	902

A number of factors have contributed to the continuing increase in trumpeter swan numbers and distribution. These include protective legislation, hunting restrictions, public education, reintroductions and land use regulations. In 1999, Alberta Environment standardized regional land use guidelines for activities near swan habitat (Appendix 1). These guidelines reduce disturbance of breeding swans and contribute to improved nesting success, and should be applied to new nesting habitats identified during the 2000 survey. These guidelines are not legislated and do not apply to private landowners (although private landowners are encouraged to use them too). On Crown land, though, many swan lakes also have protective notations (PNTs) attached to them, which means that Public Lands and the Land and Forest Service must adhere to the recommendations of provincial biologists regarding those lakes.

5.0 RECOMMENDATIONS

5.1 Continue Trumpeter Swan Relocation Projects to Establish New Winter Ranges.
A critical shortage of winter habitat is widely considered to be the primary limiting factor for the Rocky Mountain population, which includes Alberta's trumpeter swans (Shea 1979, Mackay 1981, Brechtel 1982). As a result of migration tradition, Rocky Mountain trumpeter swans and their cygnets return to the same region in the tristate area every year (Barrett and Vyse 1982, Alvo 1996, Shea 1997). The conditions in the tristate area are already crowded, resulting in competition for food, increased risk of parasitic infection, and large swan die-offs during severe winters (McKelvey 1985, Shea 1979, Drewien and Bouffard 1994). As the Rocky Mountain population continues to grow, conditions in the wintering range will become even more crowded. To help reduce the dependence of Alberta's swans on the tristate wintering region, we should expand swan relocation projects, in an effort to establish a breeding population of swans that winter in new areas. The Elk Island National Park Trumpeter Swan Reintroduction has had some success already, as swans released in the park have been observed in new wintering areas in Oregon and northern California (James 2000).

5.2 Trumpeter Swan Protection on Private Land.
Discussions should continue between Fisheries and Wildlife Management and the Energy Utilities Board to help protect swans on waterbodies adjacent to private land. For instance, if the Energy Utilities Board adopted the guidelines for activities near swan habitat (Appendix 1), oil and gas activities may be located further away from these waterbodies to help minimize disturbance during the breeding season.

5.3 Trumpeter Swan Protection on Crown Land
Trumpeter swans appear to be breeding on new waterbodies in the green zone, particularly east and south of Grande Prairie, and north of High Prairie. To help minimize disturbance on new breeding lakes, the protective notations (PNTs) should be updated to include these lakes.

5.4 Continued Trumpeter Swan Surveys
To effectively implement the first two recommendations, Fisheries and Wildlife Management must have recent data on trumpeter swan distribution and abundance.

Therefore, we recommend that local trumpeter swan surveys be continued at current levels until the next international census in 2005.

5.5 Public Education

While we do not completely understand why trumpeter swan populations have increased steadily throughout the past three decades, it has likely been the result of a combination of many things, including: landuse guidelines, protective legislation prohibiting hunting, and intensive management such as trumpeter swan relocation projects and winter feeding programs. The success of these programs is partly dependent on public awareness and support for protecting sensitive wildlife. As Alberta's trumpeter swan population continues to grow, educational brochures should be developed to encourage resource developers and private landowners to limit disturbance near swan habitat.

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Appendix 1

Trumpeter Swan Land Use Conditions.

The Natural Resources Service of Alberta Environment recommends the following conditions be applied to activities near trumpeter swan habitat through the land use permit system:

- April 1 to Sept. 30, no activity within 800 m of the high water mark of identified lakes or water bodies
- April 1 to Sept. 30, no direct flights over identified lakes or water bodies.
- No long term development (roads, wells, pipelines, etc.) within 500 m of the high water mark on identified lakes or water bodies.
- Buffers from the high water mark of identified lakes or water bodies as follows:
    - Conventional seismic lines 800 m
    - LIS seismic lines 500 m
    - Hand cut seismic lines 100 m
    - 0.5 m survey line Nil
- No shot holes where water or ice exists or on dry lakes (air/mud guns only).
- No new grazing leases issued around identified lakes or water bodies
- No range improvement within 500 m of the high water mark on identified lakes or water bodies

No timber harvesting within 200 m of high water mark on identified lakes or water bodies, special management zone for timber harvesting between 200 m and 500 m from high water mark (detailed plan required).

Appendix 2

Survey areas, methods and effort for the 2000 Alberta Trumpeter Swan Survey

SUBREGION	SURVEY AREA	DATES	SURVEY METHOD	EFFORT (hours)
Grande Prairie – Valleyview	Entire	6-7 Sep	Fixed wing	9.25
Peace River – High Level	1. Chalmers L. - Haig L. - Notikewin	24-Aug	Fixed wing	16.25
	2. Gerry L. - Notikewin Tower	7-Sep	Fixed wing	
	3. Trading Post L. - Jackpine L	11-Sep	Fixed wing	
	4. Frank L. - Jackpine L.	13-14 Sep	Fixed wing	
	5. Hay-Zama L. - Bistcho L.	29-Aug	Helicopter	3.5
Utikuma – Peerless	Entire	29-30 Aug	Fixed wing	13.4
Edson – Whitecourt	1. Whitecourt	5-Sep	Fixed wing	6.3
	2. Edson	6-Sep	Fixed wing	6.0
Elk Island	Entire	31-Aug	Weekly ground checks	N/A
Lac La Biche	Lac La Biche - Primrose L. - St. Paul - Smokey L. – Athabasca	7-8 Aug	Fixed wing	12
SW Alberta	Waterton - Pincher Creek	10-Aug	Helicopter	3.0

Appendix 3

Number of trumpeter swans found on each waterbody surveyed during the 2000 Alberta Trumpeter Swan Census. (Addapted from Norton and Beyersbergen 2000)

Region	Waterbody Name / Nesting Location	Easting	Northing	Fall 2000			
				Prs	Cyg	Single	Flocked
Edson	Rat Lake	590700	5901200	2	0		
Edson	Wolf Creek	567500	5909200		0	1	
Edson	Octopus Lake	522100	5931800	2	0		
Edson	Corral Creek	489500	5925000	2	0		
Edson	Sucker Lake	503900	5936300	2	0		
Edson	Mud Lake (Sundance)	515800	5949400	2	2		
Edson	Shiningbank Lake	564000	5969300		0	1	
Edson	Kathleen Lake	557700	5968000	2	0		
Edson	Athabasca River	575000	6003200	2	0		
Edson	Christmas Creek	603300	6022300	2	0		
Edson	Christmas Creek	606600	6023000	2	0		
Edson	Waskahigan River	482950	6039100		0	1	
Edson	Carnwood	660500	5895800	2	0		
Edson	Chip Lake	601700	5951000				4
Edson	Cynthia	604000	5906000	2	1		
Elk Island	Running Dog Lake	378600	5929800	2	0		
Elk Island	Bailey Lake	374950	5935100	2	2		
Elk Island	Flyingshot Lake	377800	5935000	2	0		
Elk Island	Birch Island Lake	380200	5951700	2	3		
Grande Prairie	Albright Lake	322000	6152700	2	5		
Grande Prairie	Albright Lake - Northeast	323200	6154400		0	1	
Grande Prairie	Anderson Lake	357650	6134600	2	7		
Grande Prairie	Barr Creek (Dixon 2)	312500	6119000	2	0		
Grande Prairie	Barr Creek 2	318500	6121150		0		6
Grande Prairie	Barr Creek 3	319100	6122600	2	1		
Grande Prairie	Bear Lake	369450	6128300		0		101
Grande Prairie	Beavertail Creek 1	326050	6129400		0		7
Grande Prairie	Beavertail Creek 2	329700	6131100		0	1	
Grande Prairie	Bisbing Lake	332250	6126450	2	5		
Grande Prairie	Boone 3	345858	6172775	2	2		
Grande Prairie	Boone Lake	347000	6161150	2	0		
Grande Prairie	Boone Lake - North	353100	6171000	2	3		
Grande Prairie	Boone Lake - West 3	338200	6163700		0	1	
Grande Prairie	Boone Lake - West 4	331200	6160400	2	1		
Grande Prairie	Buffalo Lake - West	373000	6138450	2	5		
Grande Prairie	Calahoo Creek 1	310275	6082650	2	3		
Grande Prairie	Calahoo Creek 10	338900	6086800	2	0		
Grande Prairie	Calahoo Creek 11	340900	6086550		0		3
Grande Prairie	Calahoo Creek 12 (Hiding)	308600	6076400	2	0		
Grande Prairie	Calahoo Creek 3	313550	6079900	2	0		
Grande Prairie	Calahoo Creek 4	333400	6087550	2	3		
Grande Prairie	Calahoo Creek 5	334000	6089700		0	1	
Grande Prairie	Cattail Lake	455400	6134000	2	1		
Grande Prairie	Cattail Lake - East	458350	6134200	2	0		

Region	Waterbody Name / Nesting Location	Easting	Northing	Fall 2000			
				Prs	Cyg	Single	Flocked
Grande Prairie	Chain Lake - Northeast	315850	6144450	2	5		
Grande Prairie	Chain Lake - Southwest	314200	6143150	2	5		
Grande Prairie	Clairmont Lake	388650	6123750		1	1	
Grande Prairie	Crystal Lake	387525	6117350	2	0		
Grande Prairie	Cutbank Lake - Northeast	331800	6183900	2	0		
Grande Prairie	Cutbank Lake 2 (North)	326750	6177950	2	1		
Grande Prairie	Dickson Lake	319050	6155650	2	3		
Grande Prairie	Dorscheid	403300	6070600	2	3		
Grande Prairie	Economy Creek 1	417100	6087875	2	0		
Grande Prairie	Economy Creek 10 (Type)	419600	6090700	2	0		
Grande Prairie	Economy Creek 11	418250	6091550		0		3
Grande Prairie	Economy Creek 2a	420600	6086300	2	0		
Grande Prairie	Economy Creek 4	427100	6085450	2	6		
Grande Prairie	Ellenwood Lake	417100	6096350	2	4		
Grande Prairie	Ferguson Lake	384700	6126000	2	0		
Grande Prairie	Flyingshot Lake	381500	6111800	2	6		
Grande Prairie	Fowel Lake - North	330300	6120650	2	4		
Grande Prairie	Goodfare Lake - Southeast	332100	6124500	2	0		
Grande Prairie	Goodfare Lake - West	323500	6131650	2	2		
Grande Prairie	Goose Creek 1	466500	6088900		0	1	
Grande Prairie	Goose Creek 2	466300	6099300	2	0		
Grande Prairie	Goose Lake - West	460500	6091600	2	0		
Grande Prairie	Graham Creek	315525	6119275	2	0		
Grande Prairie	Grassy Lake - West	460550	6073800	2	4		
Grande Prairie	Hamelin Creek	349500	6202050	2	1		
Grande Prairie	Hermit Lake	375000	6119000	2	6		
Grande Prairie	Horse Lake	328000	6135300	2	3		
Grande Prairie	Hume Creek - West	310500	6128750	2	0		
Grande Prairie	Jack Bird Pond	364150	6193000	2	4		
Grande Prairie	Kamisak Lake	324950	6116200	2	5		
Grande Prairie	Kamisak Lake - South	326000	6114700	2	2		
Grande Prairie	Kamisak Lake 6	321100	6114000	2	0		
Grande Prairie	Keeping Lake	314450	6149800	2	2		
Grande Prairie	Keeping Lake - North	314200	6153300	2	0		
Grande Prairie	Kit 2	317675	6115225	2	0		
Grande Prairie	LaGlace Lake	385300	6139850		0	1	
Grande Prairie	LaGlace Lake - West	352850	6139400	2	0		
Grande Prairie	Latornell River 1	432000	6072000	2	0		
Grande Prairie	Latornell River 2	434700	6073800	2	5		
Grande Prairie	Latornell River 4	434700	6073000	2	0		
Grande Prairie	Little Lake	367150	6118750	2	0		
Grande Prairie	Little Lake - South (Uswell Slough)	367050	6117700	2	0		
Grande Prairie	Long Lake	463500	6082900	2	4		
Grande Prairie	Long Lake - East	467400	6084300	2	0		
Grande Prairie	Lowe Lake	361950	6133100	2	3		
Grande Prairie	Lowen Lake - East	333800	6119100	2	0		
Grande Prairie	Martin Lake	335800	6146650	2	0		
Grande Prairie	McNaught Lake	344000	6113550	2	0		

Region	Waterbody Name / Nesting Location	Easting	Northing	Fall 2000			
				Prs	Cyg	Single	Flocked
Grande Prairie	Moose Lake	474700	6071700	2	4		
Grande Prairie	Mountain Lake	455100	6144800	2	2		
Grande Prairie	Mt. Valley (Dixon 3)	313800	6108900		0	1	
Grande Prairie	Mt. Valley 2	314150	6112300	2	1		
Grande Prairie	Mt. Valley 3	310000	6109350	2	0		
Grande Prairie	Mt. Valley 6 (NW Mt. V. 2)	317550	6112100	2	5		
Grande Prairie	Mt. Valley 7	312300	6113200	2	1		
Grande Prairie	Muddyshore Lake	447750	6142150	2	0		
Grande Prairie	Musreau Lake	395300	6044600	2	0		
Grande Prairie	Pelican Lake	457300	6098100	2	2		
Grande Prairie	Pelican Lake 1	452200	6100100	2	3		
Grande Prairie	Pelican Lake 2	450150	6099600	2	5		
Grande Prairie	Pete Lake	451700	6135200		0		8
Grande Prairie	Pierre Lake	334550	6065750	2	0		
Grande Prairie	Ponita Lake	320650	6154850	2	5		
Grande Prairie	Ponita Lake - North	320400	6156900	2	0		
Grande Prairie	Pouce Coupe River 3 (SE Cutbank)	333900	6174000		0	1	
Grande Prairie	Pouce Coupe River 4	338000	6173000	4	0		
Grande Prairie	Puskwaskau 2	458400	6116100	2	3		
Grande Prairie	Puskwaskau 5	440000	6134300	2	0		
Grande Prairie	Puskwaskau 7	460400	6113200	2	0		
Grande Prairie	Puskwaskau 8	446600	6139800		0	1	
Grande Prairie	Puskwaskau 9	445500	6139500	2	0		
Grande Prairie	Puskwaskau Lake	459150	6124550		0		15
Grande Prairie	Rat Lake	384350	6033700		0		3
Grande Prairie	Ray Lake	317800	6146700	2	2		
Grande Prairie	Simonette River 10 (Side Lake)	441200	6079500	2	5		
Grande Prairie	Simonette River 12	443800	6069600	2	5		
Grande Prairie	Simonette River 13 (Jackfish Lake)	439850	6066450	2	1		
Grande Prairie	Simonette River 15	436300	6069750	2	0		
Grande Prairie	Simonette River 2	448000	6089400	2	4		
Grande Prairie	Simonette River 7	453600	6080600	2	1		
Grande Prairie	Simonette River 9	442900	6081300	2	6		
Grande Prairie	Sinclair Lake (Brainard L.)	326000	6142000	2	5		
Grande Prairie	Smith Creek 3	320800	6096100	2	0		
Grande Prairie	Smoky River	395900	6082900		0	1	
Grande Prairie	Smoky River 16	407325	6105200	2	0		
Grande Prairie	Smoky River 18	406900	6094600	2	4		
Grande Prairie	Smoky River 20	413200	6106400	2	0		
Grande Prairie	Smoky River 21	413900	6106700	2	0		
Grande Prairie	Stump Lake	485800	6111300	2	0		
Grande Prairie	Two Lakes - North	454500	6129500	2	0		
Grande Prairie	Two Lakes - South	454350	6128300	2	2		
Grande Prairie	Updike Lake	322950	6147300		0		11
Grande Prairie	Updike Lake - East	326250	6146650	2	0		
Grande Prairie	Valhalla Lake	344750	6139550	2	0		

Region	Waterbody Name / Nesting Location	Easting	Northing	Fall 2000			
				Prs	Cyg	Single	Flocked
Grande Prairie	Valhalla Lake - Northeast	351500	6147000	2	0		
Grande Prairie	Wabatanisk Creek 2	459250	6128600	2	2		
Grande Prairie	Water Hen Lake – NE	452200	6138150		0	1	
Grande Prairie	Water Hen Lake 2	451300	6139600		0	1	
Grande Prairie	Water Hen Lake 3	450100	6140650	2	3		
Grande Prairie	Water Hen Lake 4	453350	6140100	2	5		
Grande Prairie	White Mountain 1	352800	6182900	2	0		
Grande Prairie	White Mountain 2	357400	6182500	2	0		
Grande Prairie	White Mountain 3	357300	6178600	2	0		
Grande Prairie	Whitham Lake	328200	6144300	2	5		
Grande Prairie	Wilkin Lake	350650	6128500		0		11
Grande Prairie	Windsor Creek 2	314400	6115300	2	3		
Grande Prairie	Wolfe Lake	361450	6144800		1	1	
Grande Prairie	Yoke Lake	330250	6122100	2	4		
Grande Prairie	Yoke Lake - Southeast	331200	6121300	2	0		
High Level	Bistcho Lake - East end	414500	6615000	2	0	1	
High Level	Petitot River	377650	6622300	2	0		
High Level	Bistcho Lake	380800	6629700	2	5		
High Level	Spawn Lake	415700	6651000	4	4		
High Level	Spawn Lake - South	420000	6645000	2	2		
High Prairie	Calder Lake - Southeast	646300	6192300				4
High Prairie	McConachie Lake - West	637900	6191500		0	1	
High Prairie	Utikuma 1	564600	6208300				5
High Prairie	Whitefish Tower 1	590200	6227800	2	7		
High Prairie	Whitefish Tower 2	589500	6226700				4
High Prairie	Whitefish Tower 3	581300	6226200	2	5		
High Prairie	Whitefish Tower 4	587600	6233700		0	1	
High Prairie	Whitefish Tower 5	589100	6238050	2	4		
High Prairie	Whitefish Tower 6	587600	6242800	2	0		
High Prairie	Whitefish Tower 7	566550	6226600	2	5		
High Prairie	Lubicon 1	580700	6240900	2	4		
High Prairie	Loon River 1	565400	6269900	2	4		
High Prairie	Trout River 1	652300	6237700	2	6		
High Prairie	Trout River 2	645000	6246800	2	0		
High Prairie	Peerless 1	629900	6275200	2	0		
High Prairie	Sawn Lake 1	575800	6309800	2	0		
Lac La Biche	Elinor Lake - North	456700	6062000	2	0		
Lac La Biche	Elinor Lake - West	455400	6055700				3
Lac La Biche	Portage Lake	437200	6095000	2	0		
Lac La Biche	Beaver Lake	442600	6065000		0	1	
Lac La Biche	Location????	461800	6072800		0	1	
Peace River	Kimiwan Lake	505100	6178500		0	1	
Peace River	Eaglesham - Northeast	449200	6188100		0	1	
Peace River	Frank Lake	506300	6194700	2	4		
Peace River	North Heart River	513000	6230250				3
Peace River	"Leo's Lake"	506500	6235100	2	4		
Peace River	Carmon Lake - West	509900	6244900	2	0		
Peace River	Helen Lake - North	448200	6271100	2	0		
Peace River	Otter River	529000	6276200	2	4		

Region	Waterbody Name / Nesting Location	Easting	Northing	Fall 2000			
				Prs	Cyg	Single	Flocked
Peace River	Otter River	532500	6274600				3
Peace River	Notikewin River	439900	6290700	2	0		
Peace River	Otter River	535400	6292900	2	0		
Peace River	Otter River	533000	6297300	2	3		
Peace River	Notikewin River	440200	6293100		0	1	
Peace River	Notikewin River	442100	6299900	2	0		
Peace River	Jackpine Lake	525100	6306900	2	8	1	
Peace River	Jackpine Lake - East	532000	6306400	2	0		
Peace River	Jackpine Creek	528800	6312000	2	3		
Peace River	Notikewin River	450800	6312700		0	1	
Peace River	Keppler Creek	498500	6336400	2	3		
Peace River	Gerry Lake	421300	6239700	2	0		
Peace River	Hines Creek	409600	6244600	2	4		
Peace River	Montagneuse Lake	410000	6262900	2	0		
Peace River	Montagneuse River	406800	6259600	2	0		
Peace River	Whitemud River	420200	6272500	2	3		
Peace River	Whitemud River	416600	6272800	2	3		
Peace River	Whitemud River	419100	6276050	2	0		
Peace River	Eureka River	400000	6273700	2	0		
Peace River	*South Whitemud River*	404500	6280900	2	0		
Peace River	South Whitemud River	398750	6282200	2	0		
Peace River	Notikewin River	438500	6289400	2	2		
Peace River	Whitemud River	400500	6290700	2	2		
Peace River	Notikewin Fire Tower	400850	6296550	2	0	1	
Peace River	Notikewin Fire Tower	400300	6300200	2	0		4
Peace River	Notikewin River	418200	6307500	2	0	1	
Peace River	Notikewin River	395150	6310250	2	1		
Peace River	Notikewin River	394350	6312000	2	1		
Peace River	Notikewin River	387700	6311400	2	0		
Peace River	Notikewin River	406300	6321100	2	0		
Peace River	Notikewin River	386700	6317700	4	0		
Peace River	Notikewin River	387500	6317350	2	0		
Peace River	Notikewin River	389000	6321400	2	0		
Peace River	Mearon Creek	320400	6323400	2	0		
Peace River	Notikewin River	404800	6321800	2	0		
Peace River	Alleman Creek	397200	6324100	2	0		
Peace River	Notikewin River	388800	6324600	2	4		
Peace River	Trading Post Lake	332550	6329100	2	4		
Peace River	Mearon Creek	333500	6333400	2	2		
Peace River	Mearon Creek	337500	6332700	2	0	1	
Peace River	Mearon Creek	324500	6333300	2	2		
Peace River	Mearon Creek	318700	6326100	2	0		
Peace River	Mearon Creek	338850	6333600	2	0		
Peace River	Mearon Creek	333300	6339800	4	0		
Peace River	Unnamed	325000	6334100	2	0		
Peace River	Mearon Creek	327500	6341600	2	0		
Peace River	Osland Lakes	351200	6349700	2	0		
Peace River	Mearon Creek	339650	6343800	2	0		
Peace River	Mearon Creek	335100	6344200	2	1		

Region	Waterbody Name / Nesting Location	Easting	Northing	Fall 2000			
				Prs	Cyg	Single	Flocked
Peace River	Chinchaga River	340900	6350000	2	0		
Peace River	Chinchaga River	365900	6359200	2	0		
Peace River	Chinchaga River	357250	6352800	2	0		
Peace River	Chinchaga River	359000	6357200	2	0		
Peace River	Haig River	403300	6434800				3
Peace River	Haig River	397200	6441300	2	1		
Peace River	Hay River	395200	6449600	2	0		
Peace River	Bassett Lake	414100	6464400	2	0		
Southern Alberta	Frank Lake	309000	5602500	2	0		
Southern Alberta	Margaret Lakes - North	287200	5460500	2	4		
Southern Alberta	Horseshoe Lake	290900	5449800	2	0		
Southern Alberta	Margaret Lakes - South	287600	5459800		0	1	
Southern Alberta	Carlson's Pond	285600	5462500	2	1		
Southern Alberta	Sofa Wetlands	299500	5438600	2	5		
Southern Alberta	Outpost Lake	320000	5431500		0	1	
Southern Alberta	Unnamed	316800	5435900				5
Southern Alberta	Unnamed	317650	5437800				6
Southern Alberta	Blood Timber Limit Pond	300900	5436900	2	0		
Southern Alberta	Pole Haven Pond	310400	5430200	2	0		

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(as of July 2001)

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No. 3 Distribution and relative abundance of the shortjaw cisco (*Coregonus zenithicus*) in Alberta, by M. Steinhilber and L. Rhude. (2001)

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